**Individual Project due 24:00 7 October, 2012 (to be loaded onto your wiki).**

**Name:** Paul Hume

Project - Thin client network for a small business using recycled P4 PC as thin client



The project could concentrate on installing a thin client network for a small business with solar panels, gel batteries, inverter and a small network of 20 desktop PC’s which may include a server, printer and other necessary equipment. The proposed network provides service to a business that has fluorescent lighting. The business operates between the hours 8.30am to 3.30pm (7.00 hours)

Assumptions:

• The existing computer network is ON 5 days per week 24 hours per day

• The existing lighting is ON 5 days per week 10 hours per day

**Individual Project**

1. Negotiate with the stakeholders to establish the extent to which sustainability is to be integrated

Answer: Sustainability conditions include:-

* The current use of a desktop PC as a server is no longer viable a dedicated Enterprise Server will be sourced for the project.
* The use of existing hardware (P4 workstations) is to be taken into consideration. Replacement hardware can only be purchased if the current equipment is found not to function with the proposed infrastructure.
* Current printer to be utilised as replacement or additional devices can only be purchased if the current cannot function with the proposed infrastructure.
* Support for non-functioning equipment will not be sort. This equipment will be environmentally disposed of and new energy efficient thin clients will be purchased and put into the business.
* It is understood with the server now running all the software required for the business then the IT support costs will become lower as there will be less required visits to individual workstations to fix various problems. This expected saving in the budget will be put aside a used to fund the replacement equipment described earlier.

**Hardware**

□ renewable energy source

□ low powered hardware

□ energy efficient architecture

Using older equipment (P4’s) means that any power generated by the solar panels, a first, will only offset the cost of power to the business. This is simply because the P4’s consume quite a bit more power than the proposed HP T410’s. The percentage of power contributed by the panels will grow as the P4’s are replaced. The money saved on power will be put aside to fund the replacement T410’s.

Summary: My Individual Project uses ….older P4’s to start with to save on initial costs. The project requires a new switch be purchased not only to power the replacement devices as they become available, but also run more efficiently. A dedicated Server is to replace the current workstation/server this will draw much more power but this will be offset somewhat with the power harvested from the solar panels. As the P4’s become unusable they are replaced with HP T410 thin clients.

A new eco-friendly printer is suggested to save moneys and to use more environmentally friendly inks. The unit will also save on paper as it can print double sided and will connect to the network so all printer can easily print to it. The current model is a USB device that is connected to the server. Also offsite printing and PDF printing will save costs and fund the replacement program.

**Software**

□ energy management software

**Printing**

□ local – The current printer is 3 years old and has only 1 year remaining on its extended warranty. At that time a new ergo friendly replacement machine will be sourced. In the meantime any mono printing that is over 30 pages will be out sourced to a local printing business which will take the current cost of approx. 11 cents/page and under the negotiated conditions will reduce the costs to 6 cents/page. Further negotiations are to take place to reduce this cost further which will also include 1 hour delivery and up to 97% of our printing could be done off site with no impact on the business.

Current colour printing is minimal with an ink jet printer approx. 2 years old. This printer is to be disposed as the current costs are unacceptable and all colour printing to be out sourced.

A review at the end of life for the current mono printer will take place as to the purchase of a colour/mono printer option.

□ online

□ to Pdf – Introduction of PDF printing will be implemented to help save on overall printing costs. Notices will be sent electronically to employees via email instead of posted on the notice boards. These can then be filed by the individual for later reference. Or an intranet noticeboard can be setup for staff to view electronically at their leisure with notices of changes emailed to them.

2. Advise short term technology solutions to achieve reduction of power consumption

Answer: The purchase of a power timer to ensure all clients and monitors are turned off a half hour after business hours and enabled again a half hour before business is due to start is to be implemented. This could amount to over 790 kw per year based on the power off reading from the black box pc that was tested.

Education is an important factor regarding peoples understanding of how energy consumption affects more than the bottom line of a business. A proposed business wide education program to help employees understand some of the goals of the company should be undertaken. This could result in simple but meaningful things such as people simply turning their monitor off if they know they will be away from their desks for a time and/or even placing their workstation into standby mode manually.

Printing options explained earlier will help reduce cots immediately with less toner, electricity and paper being used. The use of PDF printing will help save on paper and toner.

3. Identify energy usage within the scope of the ICT project and provide a detailed report

Answer:

|  |  |  |
| --- | --- | --- |
| **Condition**  **Current Server / Current Workstations**  **(Black Box) / (Ferrari Box)** | **Power consumption**  **(watts)** | **Notes** |
| OFF | 19 / 3.1 |  |
| MAX BOOT | 42 / 30 |  |
| IDLE | 42 / 22 |  |
| Wordprocessing | 44 / 24 |  |
| Spreadsheets | 44 / 24 |  |
| Web browsing  <http://news.bbc.co.uk/2/hi/programmes/click_online/default.stm> | N/A | No Result |
| Low level music  <http://grooveshark.com/#/s/Fall+At+Your+Feet/3KIZB0?src=5> | N/A | No Result |
| Low level video  <http://www.joost.com/39w1yk49/#/?video_info=33p1yw1t> | N/A | No Result |
| Monitor | 21 |  |
| Printing | 16 |  |

**PowerPoint Presentation**

Create a PowerPoint presentation of your individual Project with the following slides:

1. The Basics of preparing to integrate sustainability into ICT planning and design projects;
2. ICT sustainability from a business standpoint;
3. Energy efficiency as a stepping stone to sustainability;
4. Individual Project Strategy
5. Network operation and security;
6. Sketch of the recommended project system;
7. Test results
8. Short term technology solutions to achieve reduction of power consumption;
9. Energy usage within the ICT project - graph
10. Recommendations and Conclusion.

Please see Sustainability.pptx

**Individual Report**

**For your individual project answer the following:**

1. Explain how sustainability can be integrated into your individual Project

The replacement of the workstations with newer energy efficient models will bring power usage down by at least 30w for idle periods and more while performing tasks this will assist in lowering ongoing costs. The printer option of offsite printing as well as an energy efficient double sided paper using device can also have long term savings. An eco PoE switch will be required an eco PoE switch will be more efficient than a non eco type. With the use of thin clients less heat would be omitted into the surrounding area this will in turn reduce the air conditioning costs.

1. Research and identify suitable technology solutions applicable to the project

Modern Thin Clients can be powered through the Ethernet cable that also connects it to the network. This helps in setup costs as there is no need to place power points at each workstation location. This also makes the configuration somewhat portable as the Thin Clients are all in one system meaning the PC and screen are combined.

1. Explain the power consumption data compared to benchmarks

The reduction in power from the P4’s to the HP t410 all-in-one is 30 watts during usage and more in standby mode.

The benchmark for the server is the current workstation which is being used as a server. The upgrade to a dedicated server is required for security and management purposes. Its power usage is dramatically higher but this will be offset by the solar panels installed.

The switches power usage does not have a comparable benchmark as can be found in the figures below. Power usage is expected to rise to a maximum indicated in the ‘recommended actions’ column once all current P4’s have been replaced.

1. Advise how sustainable management principles may be applied to your individual project resulting in reduced environmental impact

The proposed printer will have an immediate impact on costs to run and on the environment. Using half the paper and bio friendly inks have an effect which benefits the planet.

Over time as the P4’s are replaced with low wattage devices the solar panels could in fact eventually supply all the power to run the HP T410. Reinvesting the savings made through change could see the solar panels expanded and the business can then perhaps become self-efficient for its power.

1. Provide key performance indicators (KPI) - sustainability performance for your individual Project

**Key Performance Indicators**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **SD-KPI 1: Energy / greenhouse gas efficiency of production / products in use**  **(tons CO2/year)** | **SD-KPI 2: Proportion of products with “Design for Environment” / Eco-Label**  **(√)**  **or (x)** | **SD-KPI 3: Emissions of (hazardous) waste and toxic materials**  **Yes or No** |
| DELL PowerEdge T310 SERVER | 375w\*24\*5\*52 \*6.89560/10000  = 1613.57 | Energy Smart | No |
| HP t410 All-in-one | 13w\*8\*5\*52 \*6.89560/10000  = 18.65 | ENERGY STAR® qualified  EPEAT ® Gold registered | BFR/PVC free materials |
| Lanier GX e3350N | 36w\*3\*85\*52 \*6.89560/10000  = 329.17 | EC ENERGY STAR | Yes – Non-toxic Ink |

1. Advise what actions could improve the KPI’s for your Individual Project which foster sustainability and environmental best practice

Out sourcing of the printing will reduce the hours the printer is not in standby mode thus reducing power consumption that along with its non-toxic inks which fit environment best practice guidelines. The ink usage would also be reduced saving money.

The HP t410 All-in-one units have a very low standby power usage, but that coupled with a timer that ceases all power overnight will see more savings in power usage.

1. Evaluate the estimated CO2 emissions with comparable benchmarks; and

Estimate the carbon dioxide (CO2) emissions for the Individual Project; and Individual Project + Recommended Actions

|  |  |  |  |
| --- | --- | --- | --- |
| **Hardware** | **Benchmark**  **(tons CO2)** | **Individual Project**  **(tons CO2)** | **Individual Project**  **+ Recommended Actions**  **(tons CO2)** |
| P4 PC’s / HP T410 | 24w\*8\*5\*52 \*6.89560/10000  = 34.42 | 24w\*8\*5\*52 \*6.89560/10000  = 34.42 | 13w\*8\*5\*52 \*6.89560/10000  = 18.65 |
| CISCO SGE2000P | Tested with only 2 ports  8w\*24\*5\*52 \*6.89560/10000  = 34.42 | 102w\*24\*5\*52 \*6.89560/10000  = 438.89 | 282w\*24\*5\*52 \*6.89560/10000  = 1213.4 |
| Workstation Server / DELL PowerEdge T310 SERVER | 42w\*24\*5\*52 \*6.89560/10000  = 180.72 | 375w\*24\*5\*52 \*6.89560/10000  = 1613.57 | 375w\*24\*5\*52 \*6.89560/10000  = 1613.57 |

1. Make recommendations in order of priority and give estimates of implementation costs on integration of sustainability for other ICT projects; and

Estimate potential energy savings and payback periods for recommended actions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Recommendation** | **Priority** | **Implementation Cost** | **Energy Saving** | **Payback Period** |
| HP t410 All-in-one | Low | $429 (each) | 30 watts |  |
| CISCO SGE2000P 24PT GIG 4SFP SLOT STK LAYER 2+ POE SWCH | High | $782 | Varies due to amount of PoE devices |  |
| DELL PowerEdge T310 SERVER | High | $1211 | -300+ watts | Payback in business security |
| Lanier GXe3350N | Medium | $283.94 | 11w in standby |  |